Venus Gravity Data Reduction

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The Magellan spacecraft has provided high resolution gravity data to its very end, October 13, 1994, when it was consumed by the Venusian atmosphere. After aerobraking in August of 1993 to attain a near circular orbit, excellent high latitude data were acquired which previously were very weak during the elliptical orbit coverage. There are 1500 orbits (=2.5 million observation.s) during the near circular orbit, supplying, redundant coverage at different geometries over many features. This allowed the relaxation of apriori constraints, so true amplitudes are being extracted from the data. Presently there are available, some 2266 line-of-sight acceleration profiles at the Planetary Date Node, Washington University, St. Louis, Mo. Most of them are accelerations from reductions where a 40th degree and order spherical harmonic model was used in the theoretical Doppler calculations.

Today we present the results of a 75th degree and order field that incorporates all the old Pioneer Venus Orbiter data as well as all the Magellan data to September 1994. The new results reflect even higher correlation with topography, higher amplitude values for the highs and lows, and global results that have essentially very little apriori constraint on the solution parameters. Wc also correlate our new model with the earlier ones based on 60th and 40th degree and order presentations. The covariance analysis of these field models provides quantitative measures of the individual harmonic coefficient. Detailed gravity maps overlaying surface topography are shown for Ishtar ~'errs, Beta Regio, Atla Regio, Aphrodite, Bell, Gula, Alpha, and Artemis. There still exists some small systematic signatures in the data residuals that wc anticipate will be removed when we increase our harmonic field solution to degree 90-100 this coming, year.

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4. P

5. (a) P03 Magellan
Requiem
(b) 5420 Grav. Fields
1219 Local Grav.
Anomalies

6. --

7. 0%

8. $60 check enclosed

9. 1 (by Session Chair
R.S. Saunders')

10. None

11. No